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HISTORY AND STATUS

OF

Public School Science Work

IN ILLINOIS.

A PRESIDENTIAL ADDRESS.

By S. A. FORBES,

Professor of Zoölogy, University of Illinois.

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BY S. A. FORBES, PROFESSOR OF ZOÖLOGY, UNIVERSITY OF ILLINOIS.

[Read before the Science Section of the Illinois State Teachers' Association
at Springfield, December 27, 1889.]

It is the purpose of this Society, as I understand it, to systematically investigate, discuss, and formulate methods of instruction in natural science, with a view to working out a body of sound doctrine and rational method, in respect to which we shall, if possible, become substantially agreed. These doctrines and methods we shall then hope to bring to bear on the public school work of Illinois, to the end that the science work here may be done, in time, on rational principles well understood, and by methods approved by general experience. It is a work of progress and reform to which we have pledged ourselves; progress in the knowledge of principles and in the method of applying them, and reform in the science work in the public schools under our charge or immediate influence, and ultimately, as we hope, in those of the state at large.

First of all, it seems to me, we need to clear up our own ideas and to see where we stand; to realize and recognize what we have to do, first for ourselves and second for the state. Your committee has believed that we should begin by laying foundations, and has hoped that the work of successive sessions of this Club would have more than a loose and general connection; that it would be closely

articulated and regularly and solidly built up, year after year, jointly, by us all, according to a plan pre-arranged.

In beginning a work we may very naturally ask ourselves, first, what has been done; and, second, what is next to do,—the answer to the second question dependent on that to the first,—and I have taken it for my part in the present program to prepare a brief outline of the condition of the science work in public schools at the present time; to explain and describe, as well as I can and as far as I understand the matter, the basis upon which it actually rests, and the forces which have built it up and hold it in position, and to sketch the history of its development. I very much wish that this task might be performed in a thorough-going and exhaustive manner, and I hope that this may yet be done by some one; but in the time allowable here for such a discussion I can only undertake to pick out a few items from the record, and to present them, if possible, in a way to make them available for our guidance.

The history of public school science work in this state is remarkable for one prominent and critical occurrence,—the sudden introduction by law, in 1872, of four new sciences into the list required for a county teacher's certificate. Although this legal enlargement of the public school course seems at first blush unwisely and even absurdly abrupt, and although it was unquestionably followed by many unfortunate and well nigh disastrous immediate consequences, yet a study of the situation at the time, and of the previous history of the agitation of the subject and of the progress of science teaching in the state, will show that it was not as sudden and revolutionary a procedure as might be supposed. Many incitements to progress in this direction had long been at work in the public schools. A leaven of intelligence and awakening ambition had made itself felt for many years and in many ways,—through the reports and action of the State Superintendent of Public Instruction; through the State Normal School, opened in 1857; through the operations of the State Natural History Society, organized in 1858, and including many teachers in its active membership; through the young Industrial School, now the University of Illinois, established in 1867; and, long before that (in 1850 to 1854), through the remarkable educational campaign which gave origin to the University; through the more progressive teachers themselves—a few of whom, in city and village schools, were doing science work which it would be difficult to parallel for scope and thoroughness at the

present time; through papers and discussions in the meetings of the State Teachers' Association and the State Associations of Principals and County Superintendents; and through the educational periodicals of the day.

The first State Superintendent, Ninian W. Edwards, had declared, in 1854, in his first report, that the teachers of the state should have a "practical education, in which should be included not only what is commonly embraced in the common school course, but a practical knowledge of the sciences in their application to the ordinary pursuits of life."

Dr. Bateman, in his first report, the third of the office, had said, in 1860, "The senses are the pioneers of all knowledge. The dawn and activity of the perceptive powers are always antecedent to those of the reflective. The eye is the child's first teacher; the ear its next; and for several years the chief work of education is to cultivate these organs." ~~And, again,~~ "It is the facts of the outer or material world, with which we must first deal, and the formation of habits of close and accurate observation is the great work of the elementary teacher." ~~In 1862, he admonished the teachers of the state to~~ "Keep the schools in close and living contact with the objective, the real; with nature and men and things; with the whole outer world and its moving panorama of events, as the theatre on which the pupils are to live and move and act." In his first announcement of requirements for the state certificate, made in 1861, while omitting the natural sciences from the list of branches necessary for the diploma, he commended especially vegetable and animal physiology, physics, chemistry, and geology, as subjects with which the professional teacher should by all means have some acquaintance,—without which he must suffer great loss of power. In 1868 he foreshadowed the general introduction of the sciences, and directly paved the way for it, by making the state certificate conditional upon a satisfactory knowledge of physiology, botany, zoölogy, and chemistry. The new law of 1872 merely extended to the county examination the condition which had thus been for four years applied to that for the state certificate, except that physics was substituted for chemistry.

So far, then, as the State Superintendency is concerned, the development of the public school course towards a knowledge of nature and a preparation for science teaching, was a gradual and methodical one, proceeding by slow steps to an end held long and steadily in view,

Nor was the share of the first State Normal School in this work of progress an insignificant or indifferent one. Organized in 1857 under a law placing the elements of the natural sciences on the same footing as the other studies of its course, it had contributed its powerful influence, directly and indirectly, for fifteen years, to the education of the teaching body towards this end. By 1860, physiology, chemistry, botany, and geology were taught,—in a somewhat tentative way, it is true, and each but a term, while mathematics got five terms, geography three, and vocal music nine,—but the attempt was clearly regarded as an experiment. Says Principal Hovey, “We have very few models in this department. Little is known of the possibility of so simplifying chemistry, for example, as to bring it within the reach of children. * * * The attempt, however, will be honestly made, at least so far as to put our pupil teachers in possession of the leading facts of these sciences, and the method of teaching the facts to children which seems to have the largest promise of success. The importance of the subjects would fully justify this course, even if it were not commanded by law.” The details of the courses published show that the methods were not those of the modern science teacher,—a criticism applicable for some time thereafter. Botany was chiefly a study of text and the analysis of plants; the chemistry was apparently poured over the heads of the pupils like a shower bath, and there was no students’ laboratory for many years; the physiology was demonstrated to the imagination only; and the physics was taught as a department of mathematics, by deduction from first principles, with a sovereign contempt for apparatus and experiment, not merely implied but vigorously expressed. Zoölogy was not regularly introduced until after 1872. Graduation theses were required in 1869 on some natural history subject worked out independently by the student.

To this special work of the Normal School the State Natural History Society largely contributed,—organized as it was only a year later, and having its museum in the Normal building. There Wilber and Holder and Powell and Thompson and Vasey worked, and created a little center of scientific activity, the spark of whose life has never yet gone out in Illinois. This body of amateurs, as it was at first, and this institution, as their museum later became, stood from the beginning in close relation to the schools. All the Normal men were members of the Society; Prof. Turner, of Jacksonville,

was one of its leaders; the State Teachers' Association met with it at Normal in 1861, in a joint session for the dedication of its hall, and many of the teachers belonged to both organizations; it had for its principal object a natural history survey of the state, the publications of which it was hoped would furnish a suitable foundation for science work in the schools; it regularly assumed, as early as 1868, the duty of supplying natural history materials to schools prepared to use them; it brought the official geologist and entomologist of the state, and other scientific workers, into more or less familiar association with the public school teachers; and it helped especially to interest the outside public in natural history study and instruction.

And next we come to the state—college, as I wish we might call it,—the Industrial University, as it was called at first. It was late in the field, but was compelled by the necessities of its existence to a vigorous activity in this direction. Organized especially to give instruction in the sciences and arts which underlie modern industrial life, it was evident at once that its attendance must depend largely on the general appreciation of a knowledge of science as a preparation for agriculture and the trades, and that the grade of its work depended immediately upon the previous instruction in the elements of science which its matriculates had received. Since it was, from the nature of the case, directly affiliated with the public schools, if there were no science in them there could none be required for its own entrance examinations, and it must itself do at first the work of an elementary school. Hence its regent and its trustees were earnestly active in this matter, and to its influence, I think, far more than to any other one thing, the final form of the law of 1872 was due. The science clause of this law was, in fact, introduced as an amendment by one of the University trustees, Wilson Flagg, of Madison county (a graduate of Yale, an amateur botanist, a horticulturist, and an ex-member of the State Board of Agriculture), the chairman of the senate committee on education at the time. But more important perhaps than this, the University had, most of all and earliest of all, exercised what we may call a powerful prenatal influence in this matter; since the extraordinary campaign for an educational idea which began with a convention of farmers under Prof. Turner's inspiration in Putnam county in 1851, and ended at Washington in the passage of the land grant act of 1862,—since this agitation for the education of the mass of the people towards and not away from their future callings, carried al-

ways in its bosom, if not in its arms, the logical consequence that such an education must be had in the public schools as well as in the university, if it is to affect the welfare of the many and not only of the few. And this, I have come to think, as I have studied the record of the time, was clearly the main line of the movement which resulted in our legal enactment. The State Superintendents' reports, the State Normal School, the State Natural History Society, and the other things to be mentioned, were more or less powerful secondary aids; but the main result followed directly from the industrial agitation of the fifties. That reaching upward of the masses for more power and more light, which, spreading from Illinois eastward, gave us later the long line of land-grant colleges, and gives us now the State Experiment Stations, gave us also, as a sort of second growth from the seed first sown, the recognized acceptance of the natural sciences as a necessary part of the course of study in a true people's school. That this fruitful movement arose earlier and went further here than elsewhere, I attribute to the fact that it had here an able and devoted leader, who, himself an educated man, had those great human qualities which no learning can overlay, and which gave him access to all classes and power with all. The teacher who, knowing the history of the state, does not to-day honor Jonathan Baldwin Turner as a patriot and a public benefactor, does dishonor to himself.

Of course I need not say that the schools and teachers, especially the better ones, shared in this steady growth and felt the stimulus of the light and inspiration centered upon them from so many sources. Beginning in 1851, we find a superintendent of Stark county saying hopelessly that, desirable as it is, he sees little prospect of a study of science in his schools, and, indeed, that some of his people still object to geography, even, as contrary to the Bible, because it teaches that the world is round instead of having four corners; but in 1872, Principal Roberts, of Galesburg, says in his presidential address to the State Teachers' Association, that probably all the teachers really fitted to teach the sciences were actually teaching them when the new law went into effect.

Chicago has always gone her own way in these matters, within the state but not of it, and has to-day no natural science in her grammar schools, as I learned lately in response to a circular request for information. In her high schools, however, these subjects have had a place from the beginning, apparatus for chemistry and for physics

being supplied in 1856 as a part of the original equipment of her first high school. Indeed, in 1869 the general introduction of natural history throughout the schools was advocated at some length by the president of the city board, and the examinations required for admission to the high school at that time show that candidates had received some general instruction in the sciences of nature,—apparently the object lessons of that day.

The Cook County Normal, opening in 1867 with a two years' course, gave object lessons for four terms and taught botany for one and physics for two. In the Peoria County Normal School, botany and physiology were taught in 1872, under Principal White. In the Aurora schools, Principal Jones had introduced in 1868 an elaborate course in natural science, beginning with the first year of the primary, and running through the high school. In the primary, lessons were given on the human body and on animals and plants; in the intermediate, on the human body and the laws of health and in mineralogy and botany, the last studied with specimens in the pupils' hands. In the high school, more advanced and systematic work was done in botany, zoölogy, physiology, and physics. The work of this school was elaborately described by Dr. Bateman in his report for 1868, under the title of "a model graded school." In the Carrollton high school, botany and physiology were taught in 1870 in the first year's course, and chemistry and physics in the second. In 1871 Etheridge published, as Superintendent of Bureau county, a graded course for his rural schools, in which object lessons ran through all the grades from the second to the sixth, and included something of anatomy and physiology, the zoölogy of the domestic animals, and the like.

In this same year two other model courses of instruction were made public; one for the lower grades and one for high schools, the former by White, of the Peoria County Normal, and the latter by Miss Grace Bibb, of the Peoria City High School, afterwards an instructor in the University of Missouri. In White's lower grade program one third of the time of six-to ten-year-pupils was given to oral object lessons; from ten to thirteen years, one sixth of the time to botany and physiology; and from fourteen to sixteen years, one ninth of the time to zoölogy and physics. Two and a half years out of eleven were thus given to natural science,—in a ratio diminishing towards the high school. How different this from the common pretence of the present time that the natural sciences are

higher branches, to be taught in the high school only! Miss Bibb's four years' English high school course gave more than one third of the time to physiology, botany, physics, chemistry, and geology; and her mixed course more than one fourth.

Roberts, of Galesburg, in the address already mentioned, allotted one third of the time in the high school to the sciences of nature.

In the Peoria High School, under Coy, in 1871, collections were made by the pupils, and museum cases were provided. In the Dixon schools the directors required, in that year, all teachers employed by them at the time and all candidates for positions there to pass examinations in physics, physiology, and botany, besides the studies required by law.

I consider it a remarkable fact that in all the abundant writing and discussion of that day, I do not find anywhere a note of discord. There was no opposition, objection, or even criticism of the movement, important enough to show itself in print.

To follow out this process of the growth and development of opinion, knowledge, and experience, during this period preceding the passage of the amended law; to show how the subject attracted continually greater and more important attention in the teachers' institutes and associations—county and state—in the gatherings of principals and county superintendents, and in the essays and addresses contributed to the two leading educational periodicals of the state—*The Illinois Teacher* and *The Chicago Schoolmaster*—would be to describe point by point the gradual dawning of the day, and would leave me no time to speak of the interesting effects which followed when the machinery of the law laid hold of the slowly rising sun, hauled it above the horizon with a single pull, and bade it shine there in full blaze without further loss of time. Some teachers were greatly rejoiced at this miraculous interposition in favor of their hopes and aspirations; but most seemed unmistakably startled, and evidently began to think that it was likely to be a very warm day. "The natural sciences are upon us, and we must do the best we can," one such is quoted as saying.

That the law was a surprise to most of the teachers, neither expected nor wished, indeed, at the time, is shown especially by this circumstance: The original bill amending the school law of the state (but without the science clause, which was an afterthought) had been introduced in the previous session of the legislature, but not finally

acted on; and a copy of this bill, published by State Superintendent Bateman, was widely circulated in 1871 among the leading teachers of the state, to call out an expression of their opinion. It was considered and reported upon by committees of the State Teachers' Association, of the Principals' Association, and of the County Superintendents, and important amendments were made to bring it into accord with their various views; but neither by Dr. Bateman himself, nor anywhere in the published correspondence and discussion, so far as I can find, was any mention made of a change in the requirement for the teacher's certificate, or of the introduction of new studies into the common schools. The teachers were working toward this end and preparing for it, but they were not yet ready. This thing was clearly done by others, over their heads, and in advance of their wishes, although not really against them. Let us note especially the fact that the motive to the doing was not wholly the teachers' motive. The beetle that drove the wedge home and struck the blow that split the log was really the *practical*; these subjects were added to the public school course because it was hoped that a knowledge of them would help the people to live, and especially that the lot of the countryman and of the workmen in towns would be ameliorated if they knew more of the facts and laws of matter and of life. And while this is clearly true, it seems also true that the common interest in the matter was not very great. It was an indefinite and half-hesitating sentiment, a diffuse and often ignorant inclination to believe, rather than a positive belief, which was made effective for the purpose it accomplished only because it had been fanned by agitation and focused by the energetic will and vigorous intellect of a few popular leaders. The situation was thus unusually interesting; and the subject is a fit one for a monograph. I can only briefly describe what followed.

The somewhat inconsiderate character of the original Flagg amendment is shown by the fact that, as introduced and as it passed the Senate, it made no exception to the requirement that every teacher in the state presenting himself for a state or county certificate must pass an examination in the elements of the natural sciences. A proviso permitting superintendents to issue, at the request of directors, certificates good for a year and in the district only, to teachers otherwise competent but not prepared for science teaching, was introduced as an amendment in the House and afterward concurred in by the Senate. These provisional certificates were, however, very

naturally regarded as a makeshift and a badge of disgrace, a pledge of toleration only, and to the mass of teachers a full certificate seemed immediately indispensable. They were not content to take the provisional one for a year, and in the meantime to make ready for a genuine examination, but they must have a full certificate before the school year opened. The law went into effect July 1, and the schools generally began in September. There were two or three months, consequently, in which to learn four sciences, and, more than that, to learn to teach them; so county institutes had a boom—not very seriously affected by the fact that there were few competent to teach the new branches in them. The State Institute at Normal was thronged; and there all the sciences were taught, each forty-five minutes a day for three whole weeks—about eleven hours to a science, in all. The pupils were also advised to read a book, if possible, before coming to this institute.

The results of this wild work were not always perfect. A friend of mine, who was a village school director at the time, has lately given me an illustration. A teacher fresh from this Normal Institute was conducting an exercise in zoölogy, while the director sat, book in hand, supervising the same. The teacher read from his Normal note-book to his class something about the *candal* appendage of an animal. "Isn't that word *caudal*?" modestly asked the director. "O," said the startled scientist, "is it caudal in the book?"

It need not be said that the "graduates" from these "courses" usually passed their county examinations and got the coveted full certificate. For the makers of the law had either overlooked one most important point, or else had made a curious assumption. The fact was recognized that the teacher's qualification must be tested by an examination, but no one was set to examine the examiners. It seems to have been assumed that the county superintendent was necessarily and ex-officio a botanist, a zoölogist, a physiologist, and a natural philosopher; and that he was also a *teacher* of all the natural sciences. It may be surmised that the examinations were not usually dangerous, except, possibly, to the well informed. A lady of my acquaintance told me that a superintendent asked her to which class the turtle belonged. She answered that it was a crustacean, because it had a crust—thinking of pie-crust, probably, with its upper and lower layers and the filling between. "No," said the superintendent, "it's a mollusk, because it wears a shell." But she got her certificate.

And this indiscriminate scramble for the counterfeit presentment of the thing desired, was unfortunately not confined to the vacation work of 1872. I regret to have to record the fact that during the regular sessions of the Normal School a special class was organized of would-be science teachers, who were hustled through all the new branches in a single term. This was done with many self-accusing groans, and certainly with no unworthy motive, but because, all things considered, in the abnormal situation which had been artificially created, it seemed to those responsible the part of practical wisdom so to do.

Similar considerations must excuse the action of some county superintendents, who made haste to renew, before July 1, all certificates of the good teachers in their schools, so that for two years these might be at least nominally qualified for any situation. *The Schoolmaster* published some outline lessons in botany and zoölogy, two of the former covering about three pages of print, the latter more elaborate, and then assured its readers that an eminent botanist had said that any teacher who had learned all which these two lessons contained should be considered entitled to the certificate, so far as botany was concerned; and the editor said further that a diligent reader of the journal for the year should have no difficulty in passing all the natural science examinations. Even the requirements of the state superintendent's office fell far short of an ideal standard of proficiency. An elementary knowledge of zoölogy, to take an extreme example, was defined to embrace the chief distinguishing characteristics of the four grand divisions of the animal kingdom, a general knowledge of the five vertebrate classes and their principal orders, and some special acquaintance with insects and their chief divisions.

A single statement from the ninth superintendent's report is eloquent as to the results. During the three months after July 1, 1872, 3,975 teachers were examined in the natural sciences, and 3,114 passed.

But when this host of smatterers had been safely garnered in the schools, and the worst strain of the sudden pressure had been thus relieved, the solid and enduring work of thorough preparation began, or rather went on at an accelerated pace.

In one circular after another Dr. Bateman conveyed to teachers and school officers full but concise official directions, mingled with the most helpful suggestion and intelligent advice; while his next

biennial report went like a trumpet call to all corners of the state, summoning the teachers to come up, like an army that had suddenly won an almost unlooked-for victory, and occupy in force, and once for all, the new regions which had fallen under their control. The seventy-five pages of this report on the natural sciences in the schools deserve to become a classic. It is a discredit, not to Dr. Bateman, but to the author of the work, that the name of the former does not appear in "Hall's Bibliography of Educational Literature."

Dr. Gregory, also, regent of the university, who, as state superintendent of Michigan, had strongly urged ten years before that the time for the old studies be abridged and the natural sciences be introduced beside them, contributed by lecture, circular, and personal advice, to give right direction to the rapid onward march; while the development of the scientific courses in the growing university helped supply the greatest need of the time, that of trained and intelligent science teachers. The State Normal School at Normal continued its scientific work with the addition of a term of zoölogy, and with a great improvement in its methods in every branch. To it was also due the continuance of the Natural History Museum as an independent establishment, after the death of the State Society and the departure of Powell, Vasey, and others from the state. It contributed from its funds to the support of the educational work of the museum, giving it shelter, standing, and indorsement in the state when, practically abandoned by its founders, it had little else to go upon, and keeping it alive until an opportunity arose to get for it legal recognition as a separate institution. It also stood behind the two summer schools of natural history held at the museum in 1875 and 1876; schools at which Professors Wilder and Barnard of Cornell, joined with Burrill of the University, Thomas of the Southern Normal, and the writer, to give instruction for four weeks in zoölogy and botany to forty or fifty active and enthusiastic teachers. A greater supply and variety of marine objects for dissection were had at these inland schools than at their Penikese predecessor. From this museum (later the State Laboratory of Natural History) large supplies of specimens were sent out, and at the Bloomington meeting of the State Association in 1873, an organization of schools and colleges was formed for the collection and exchange of natural history material, this to pass through the museum at Normal for determination, preparation, and distribution. This work was kept up,

the museum duplicates being added to the sets sent out, until all the schools participating had respectable cabinets.

The educational journals of 1872 and 1873 were very largely given up to a discussion of science teaching; and those who imagine that the new movement went astray because of the ignorance of its leaders, will do well to look at the volumes of *The Teacher* and *The Schoolmaster* for those years. While the discussion of general principles sometimes lacked scholarship, it was nevertheless sound in the main; and the outlines of work and the formal lessons presented and the courses and detailed methods recommended, were usually the results of solid thinking and successful experience. Another class of helpful papers published at this time consisted of hints for self-help in field work and study, by those whose own experience had taught them how to instruct their fellows. In fact, all the educational institutions and associations of the day were worked at full speed, vacations and all, to bring the mass of the teaching body up to the requirement of the law. So a great impulse was given to honest and earnest work—there is no doubt of that—and the science movement soon gained genuine strength and impetus enough to successfully endure the strain of the reaction which inevitably came when the slipshod work done by the incompetent began to bear its fruit. In many of the schools presided over by these teachers the sciences went out of the window almost as fast as they came in by the door,—fortunately for such schools, because such teaching as these subjects had, could result at best only in an irreparable waste of precious time.

But time forbids my following the subject out in further detail, and I can only hurriedly sketch the present situation. In the first place, the sciences are hardly in the rural schools at all—those for which it was fondly hoped they would do the most. This is partly due to a change in the law itself, made in 1874, chiefly in the interest of the low-grade teacher, limiting the requirement of these branches to the certificate of the first grade only. Most of the country teachers hold certificates of the second grade, and cannot teach the sciences if they would. We have to reckon also with popular ignorance and with a sluggish public sentiment with regard to any aspect of the matter save the financial one. Among the better informed there is some uneasiness on this subject, and you can get a vote at any general country gathering favorable to the teaching of these branches in the country schools, if you ask for it, and because you ask for it,

unless, indeed, it occurs to some one that this would raise the teachers' wages, and then you will probably have to fight for what you get. The sciences are not there, in short, because the country teachers cannot teach them, and because the average rural tax-payer does not care enough for them to be willing to pay their present cost. In the cities and villages of the better class, the elements of these branches seem pretty firmly fixed in the high school course, but it is only the elements, and the work actually done belongs, usually, in the grammar school or still lower down. In now and then a town or city school, as at Aurora, Decatur, and Cairo, there is a graded and well-knit science course throughout. I have some statistics on these matters which there is not time to give.

As to methods, they evidently differ widely. The lineal descendant and successor of the teacher who got his science in three weeks is still to be found in the school room, and he may teach from the book alone, but even he knows better as a rule; and where there is time and talent for the work, the teaching is often excellent. The right general ideas are common property, but they lack fullness and detail—in short, scholarship; and have not been worked out in systematic, well-knit, correlated methods and courses, adapted to the country school, and to the various grades in city and town. The motive to the work seems now almost wholly pedagogical and its economic basis has chiefly fallen away. This is partly due, I think, to that sluggishness of popular interest already spoken of, and partly to the fact that the actual work of the school has not commonly been directed to the economic end, and so the utilitarian results hoped for have not followed. The professional feeling of the teacher has sometimes kept him from this, and often he simply has not known how.

All this has, perhaps, a discouraging sound, as a report of progress after seventeen years, and yet it offers us this very great encouragement. The whole matter is now practically in the teachers' hands; and we are vastly better prepared in every way to meet the difficulties, to solve the problems, to apply and develop methods, to arouse the public interest, and to justify our work by its results, than we were in 1872. Let us natural science teachers band ourselves together, ground ourselves and each other, so far as we have not already done so, in a sound pedagogy based on a sound psychology; study the methods of foreign lands, where our subjects have been longer taught than here; agree, if possible, on courses and methods

for the country schools` and for each class of the graded school; examine and report upon the science work in our various towns, in our counties, and in our congressional districts; publish as fast as we are sure that our work is good and sound and true, and not before; and so lay together and build up, from year to year, by the method of coöperative effort, a solidly-based and well-wrought scheme of science work for the public schools of Illinois.





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